evidenced by copies of (i) page 3 of the application transmittal, (ii) the cover of the priority document, and (iii) a return post card, copies of which are enclosed herewith. Accordingly, the Applicants respectfully request that a more thorough search be performed to locate the certified copy.

Furthermore, an Information Disclosure Statement was filed concurrently with the application and a Supplemental Information Disclosure Statement was filed on October 3, 2002 (collectively the "IDSs"). Hence, the Applicants respectfully request that the Examiner provide Applicants with a copy of the PTO From 1449s, which were filed with that IDSs, that have been duly initialed by the Examiner as proof that the references contained therein have been considered.

35 U.S.C. § 102(b) REJECTION

The Examiner has rejected claims 1-5, and 8 under 35 USC 102(b) as being anticipated by U.S. Patent Number 6,418,029 to McKee, et al. ("McKee" or the "McKee Reference"). The Applicants respectfully traverse these rejections for reasons detailed below.

The McKee reference discloses an electronic device to decouple a printed circuit board (PCB) to reduce noise that also provides an electrical interconnection path between a dielectric substrate 10 and the PCB. See, e.g., McKee, col. 3, lines 1-5. The underside of the substrate 10 includes a plurality of solder pads 30, which

> are arranged in a regular array or matrix, but the arrangements of the pads is left to the whims of the designer and can assume a wide variety of configurations or layouts [ ].

Id., col. 3, lines 37-40 (Emphasis added). A plurality of solder spheres 40 is attached to less than all of the solder pads 30 on the underside of the substrate 10 and "very small chip component[s] 50" are attached to the remainder. Id., col. 3, lines 49-50.

These components 50 are resistors, capacitors or inductors that are

> vertically mounted such that only one end or termination 55 of the component is attached to the solder pad 30 and the other end or termination 56 is suspended in free space and is not connected to any of the solder pads on the substrate 10.

Id., page 3, lines 50-60. Instead, the other ends or terminations 56 are soldered to the PCB as are the solder balls 30. This arrangement provides a location for the chip component 50 that is as close to the die as possible, which reduces noise by reducing the capacitance area. Moreover, the component 50 also serves as an electrical interconnection between the PCB and the substrate 10. See, e.g., Id., page 4, lines 14-23.

The Applicants respectfully asserts that, the Examiner misunderstands the purpose of component 50, which equates to "a composite connection material formed of a core and a conductor covering said core" as claimed by the present invention. Furthermore, the Applicants respectfully maintain that there is nothing in the McKee reference that teaches that the core material has a low modulus of elasticity at room temperature.

Furthermore, with respect to claims 1 and 8, the invention as claimed includes a composite connection material 9 and a single-layer connection material 3 that are both arrayed on a single electronic component. Thus, an array of a composite connection material 9 and a single-layer connection material 3 on a single electronic component enables self-alignment, which is caused by surface tension that is created when the single-layer connection material 3 melts. McKee does not teach a first and a second connection material on a common electronic component.

With respect to claims 2 and 3, McKee teaches whimsical placement of the solder pads, whereas the present invention locates solder pads for the composite connection electrodes in areas of greatest stress (claim 2) and, more particularly, in

corner areas of the substrate (claim 3) where they can serve a function in stress relief. Indeed, McKee does not even address the same problem addressed by the invention as claimed. The McKee references addresses reducing noise in such a manner that also frees up more board space. In contrast, the invention as claimed addresses devices and methods that provide stress relief to minimize cracks in the electrodes and provide effective alignment of the electrodes.

Accordingly, the McKee reference does not teach or suggest the invention as claimed. Thus, it is respectfully submitted that, claims 1 and 8 and all dependent claims thereof are not anticipated or suggested by the McKee reference and, further, satisfy the requirements of 35 U.S.C. 100, et seq., especially § 102(b). Accordingly, claims 1-5 and 8 are allowable. Moreover, it is respectfully submitted that the subject application is in condition for allowance. Early and favorable action is requested.

35 U.S.C. § 102(e) REJECTION

The Examiner has rejected claims 6, 7, and 9 under 35 USC 102(e) as being anticipated by U.S. Patent Number 6,337,445 to Abbott, et al. ("Abbott" or the "Abbott Reference"). The Applicants respectfully traverse the grounds for these rejections for the reasons provided below.

The invention as claimed includes a composite connection material 9 and a single-layer connection material 3 that are both arrayed on a single electronic component. Thus, an array of a composite connection material 9 and a single-layer connection material 3 on a single electronic component enables self-alignment, which is caused by surface tension that is created when the single-layer connection material 3 melts. In contrast, the Abbott reference merely discloses a composite connection material 800.

Accordingly, the Abbott reference does not teach or suggest the invention as claimed. Thus, it is respectfully submitted that, claims 6, 7, and 9 and all dependent claims thereof are not anticipated or suggested by the Abbott reference and, further, satisfy the requirements of 35 U.S.C. 100, et seq., especially § 102(e). Accordingly, claims 6, 7, and 9 are allowable. Moreover, it is respectfully submitted that the subject application is in condition for allowance. Early and favorable action is requested.

The Applicant believes that no additional fee is required for consideration of the within Response. However, if for any reason the fee paid is inadequate or credit is owed for any excess fee paid, you are hereby authorized and requested to charge Deposit Account No. **04-1105**.

Respectfully submitted,

Date: October 28, 2002

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ANNEX TO AMENDMENT

MARKED UP VERSIONS OF AMENDED CLAIMS

IN THE SPECIFICATION

Please replace the paragraph beginning at line 31 on page 4 with the following:

A semiconductor device according to the present invention is an electronic component including, on electrodes, a plurality of connection materials connected to another electronic component. The connection materials include a composite connection material formed of a core and a conductor covering the core, the core having ~~an~~ a low modulus of elasticity at room temperature smaller than ~~an a low~~ a modulus of elasticity of the conductor at room temperature, and include a single-layer connection material formed of a conductor.

Please replace the three paragraphs beginning at line 6 on page 15 and ending at line 20 on page 16 with the following:

The self-alignment function is explained below in more detail. Single-layer connection materials (bumps) 3 arranged in the inner area in the electrode region of the semiconductor device melt in a mounting process to serve the self-alignment function. Accordingly, nuclei 1 covered with melted conductor in composite connection materials 9 move to respective positions appropriate for stress alleviation after mounting. If all of the connection materials are composite connection materials, an undesirable state occurs as described below. Suppose here that nuclei 1 of composite connection materials 9 are each a resin ball with ~~a low~~ a low modulus of elasticity and the resin ball is covered with a conductor, which is Sn-Pb alloy. When semiconductor device 5 having these connection materials is connected to substrate 6, the smaller amount of conductor, Sn-Pb, covering resin balls 1 results in an insufficient self-alignment function. Then, resin balls do not move to respective

positions suitable for alleviating stress after mounting and accordingly, resin balls are connected as they are in the positionally deviated state.

On the other hand, if connection materials of the semiconductor device are partially constituted of single-layer connection materials 3 formed of Sn-Pb solder balls, for example, the Sn-Pb solder balls melt in a mounting process to perform the self-alignment function. Accordingly, composite connection materials 9 move to appropriate positions. Naturally, resin balls 1 also move to respective positions appropriate for alleviating stress after mounting. As single-layer connection materials 3 are formed of Sn-Pb solder balls, which are likely to creep, for example, the stress exerted on the semiconductor mounting structure after mounting can be alleviated to enhance the connection reliability. Instead of the Sn-Pb solder balls, solder balls like Pb-free solder based on Sn and containing Bi or the like may be used. The Pb-free solder containing Bi or the like has a high ~~a low~~ modulus of elasticity so that the connecting portion of the semiconductor mounting structure can be reinforced.

In a mounting structure of a semiconductor device having single-layer connection materials 3 and composite connection materials 9 arranged in an area-array form, if a bending load is applied to the mounting structure for example, most of the load is applied to connection materials in outer rows. As shown in Figs. 3A and 3B, composite connection materials 9 can be arranged in outer rows A_o of the area array to allow the entire mounting structure to endure the bending load. When the bending load is exerted, the semiconductor device with a semiconductor chip has a high ~~a low~~ modulus of elasticity and thus the semiconductor device is resistant to the bending. Consequently, only the substrate deforms to cause a state close to peeling. Then, an excessive force is exerted on the outside of the mounting structure of the semiconductor device. For connection materials between the semiconductor device and the substrate, upper pads (electrodes) and lower pads (electrodes) are separated from each other so that the state of stress is like the tensile stress state. Then, elastic bodies with ~~a low~~ a low modulus of elasticity such as resin balls are included in the

connection materials to alleviate the stress on the connecting portion by means of the resin balls. The mounting structure can thus resist bending.

IN THE CLAIMS

Please **amend** the following claim:

1. (Amended) An electronic component including, on electrodes, a plurality of connection materials connected to another electronic component,
said connection materials including
a composite connection material formed of a core and a conductor covering said core, said core having ~~an~~ a low modulus of elasticity at room temperature smaller than ~~an~~ a ~~low~~ modulus of elasticity of said conductor at room temperature, and
a single-layer connection material formed of a conductor.

6. (Amended) A method of mounting a semiconductor device on a substrate, ~~said semiconductor device including, on an electrode, a composite connection material formed of a core and a conductor covering said core, said method~~ comprising the steps of:

forming a composite connection member formed of a core and a conductor covering said core on a first electrode of said semiconductor device;

forming a single-layer connection member formed of a conductor on a second electrode of said semiconductor device;

forming an auxiliary connection part in contact with an~~the~~ upper side of one of the first electrode and the second electrode~~an electrode~~ of said substrate, said auxiliary connection part being formed of a low melting-point conductor having a melting point of at most a melting point of said conductor covering said core; and

matching respective positions of said auxiliary connection part and said composite connection material to bring into contact said auxiliary connection part and said composite connection material, and heating to connect said auxiliary connection part and said composite connection material.

9. (Amended) A mounting structure for mounting a semiconductor device, that is connected to a substrate via a composite connection material formed of a core, ~~and~~ a conductor covering said core, and a single-layer connection material, wherein

said composite connection material and said single-layer connection material have~~has~~ a substrate contact portion contacting said substrate and an electrode contact portion contacting an electrode of said semiconductor device, respectively, and melting point~~s~~ of said substrate contact portion are both~~is~~ lower than those~~that~~ of said electrode contact portion~~s~~.